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**Remarks**

This paper accompanies a Request for Continued Examination (RCE).

A. Summary of prosecution to date

The outstanding rejection is found in the Final Rejection dated August 1, 2007. Here, on page 2 of the Final Rejection, it is stated that claims 2-4 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Kawajiri et al. (US 5,719,318) in view of Brockwell et al. (US 6,492,548).

Applicant responded to the Final Rejection of August 1, 2007 by filing the Amendment and Remarks of September 8, 2007. Review of such Amendment and Remarks, along with this present paper, is respectfully requested.

It is respectfully submitted that the appropriate standard of review is found in KSR International Co. v. Teleflex Inc. et al., 550 U.S. \_\_\_, 127 S. Ct. 1727 (2007), and that this decision mandates that the scope and content of the prior art are to be determined.

As to the scope and content of the Kawajiri et al. and the Brockwell et al. references, the Examiner has provided as follows in the Final Rejection of August 1, 2007 on pages 2 to 3:

The Examiner acknowledges that Kawajiri et al. and Brockwell et al. are silent as to the particular catalyst precursor used for the production of acrylic acid.

Applicant agrees with the Examiner as to the scope and content of Kawajiri et al. and Brockwell et al.

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Applicant had discussed the scope and content of Kawajiri et al. and Brockwell et al. in the Amendment and Remarks of June 2, 2007:

The catalyst as disclosed in Kawajiri et al. is not prepared via any catalyst precursor (composite), but is prepared directly from simple compounds of elements constituting the catalyst similarly to conventional catalyst production processes (column 2, lines 56-63 and Examples), which correspond to the Comparative Examples of the present invention.

In addition, Brockwell et al. only discloses using a commercially available product as the acrolein-to-acrylic acid catalyst (column 6, lines 63-65 and columns 9 and 10 (Examples)) and even does not disclose or suggest any catalyst production process. Therefore, the catalyst as disclosed in Brockwell et al. appears to also be produced by conventional catalyst production processes similarly to Kawajiri et al., that is, not via any catalyst precursor (composite).

KSR International then mandates that the differences between the prior art and the claims at issue are to be ascertained.

What is the difference that applicant claims? This difference is as follows and this difference is positively recited in independent claim 2:

- wherein a supply source of said element A for preparing the catalyst is a composite of at least one element selected from among cobalt, nickel, iron, lead and bismuth and at least one element selected from among molybdenum, vanadium, and copper.

How does the Examiner discuss such difference? The Examiner has provided as follows in the Final Rejection of August 1, 2007 on pages 2 to 3:

The Examiner acknowledges that Kawajiri et al. and Brockwell et al. are silent as to the particular catalyst precursor used for the production of acrylic acid. Nevertheless, Kawajiri et al. teaches all the components of the catalyst. The primary reference, Kawajiri et al. goes on to say that "the catalyst particles used in the present invention can be produced by any of various processes ordinarily used in production of such catalyst particles...the starting materials used in production of the catalyst particles are not particularly restricted..." (column 2, lines

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56-58). This could include Applicant's catalyst precursor.  
[emphasis added].

As applicant asserts in the Amendment and Remarks of September 8, 2007, this rejection does not meet the standard of KSR International because 1) such is not an explicit analysis, 2) such is a mere conclusory statement, 3) such is not an articulated reasoning, 4) such is exactly the type of TSM (teaching, suggestion, motivation) type of argument that KSR International frowns upon.

B. Further arguments against rejections:

B.1. Differences between the present invention and the cited prior art:

B.1.1. Against objection for easy arrival at present invention from teachings of cited prior art:

As argued in the previous Response, the Examiner's objection that the use of the composite-oxide catalyst as recited in claim 2 of the present application could have easily been thought of by a skilled artisan from the teaching of the Kawajiri reference that there is no especial limitation on starting-materials for catalyst preparation is too much long a leap of interpretation of the Kawajiri reference.

The art of Kawajiri is featured by a way of disposing (placing) a catalyst in each reactor tube of a fixed bed multitubular reactor "in such a manner that the volume of catalyst particle becomes smaller as the position of catalyst layer changes from the raw material gas inlet side of the tube to the raw material gas outlet side" (e.g. claim

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1) and thereby provides good effects in respect to such as safety and prevention of deterioration of catalyst life time (e.g. column 5, lines 16-39). On the other hand, in the present invention, the above use of the composite-oxide catalyst as recited in independent claim 2 of the present application provides the following effects or advantages: 1) activity, selectivity, and catalyst life time are excellent and 2) a stable performance is displayed for a long time. Therefore, it is clear that the present invention differs from the art of Kawajiri in fundamental idea.

In addition, Kawajiri does not disclose or suggest that the use of the characterizing composite-oxide catalyst in the present invention provides excellent effects with respect to activity, selectivity, and catalyst life time. Therefore, even a skilled artisan could not have been easily led to the finding that the use of the composite-oxide catalyst as defined in independent claim 2 of the present application is appropriate for obtaining the above excellent effects.

B.1.2. As to differences from Examples of Kawajiri:

As argued in the previous Response of September 8, 2007, the Examiner compares Example 1 of Kawajiri with Example 6 of the present invention and alleges that the yield of acrylic acid in Example 1 of Kawajiri is higher than that in Example 6 of the present invention by as much as 6 %. However, depending on reaction conditions, the performance of a catalyst changes greatly.

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Example 1 of Kawajiri differs from Example 6 of the present invention as to reaction conditions such as gas composition (concentration) and space velocity. In addition, the yield of acrylic acid in Example 1 of Kawajiri is calculated from acrolein, whereas the yield of acrylic acid in Example 6 of the present invention is calculated from propylene which is a precursor of acrolein. That is to say, the yield of acrylic acid in the present invention is a total yield of acrylic acid from propylene in a two-step process where acrolein is obtained from propylene and thereafter acrylic acid is obtained from the resultant acrolein. In other words, the yield of acrylic acid in the present invention is a total yield of acrylic acid from propylene as given by taking into account so far as conversion of propylene and yield of acrolein from propylene when obtaining acrolein from propylene. Therefore, it is a matter of course that a total yield of acrylic acid from propylene in the present invention is lower than a yield of acrylic acid from acrolein in Kawajiri.

For example, if 78 mol of acrolein and 10 mol of acrylic acid are obtained from 96 mol of propylene and if acrylic acid is further obtained from the resultant acrolein in a yield of 93 mol % based on the acrolein, then

- total yield of acrylic acid from propylene =  $(78 \times 0.93 + 10) / 96 \times 100 = 86.0$  (mol %)
- yield of acrylic acid from acrolein = 93 (mol %)

Thus, the yield of acrylic acid being calculated differs according to whether it is calculated from propylene with the propylene taken as the starting material or from acrolein with the acrolein taken as the starting material. Therefore, it is a matter of course that a yield of acrylic

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acid as calculated from propylene is lower than a yield of acrylic acid as calculated from acrolein.

Therefore, in order to correctly compare the present invention with the art of Kawajiri, it is meaningless unless the comparison is made under the same conditions. Thus, in order to correctly compare the present invention and the art of Kawajiri as to the catalyst, the comparison should be made between Example 6 and Comparative Example 4 in the present application. Comparative Example 4 of the present application shows a result of a test where a catalyst which had a composition falling in the range as disclosed in Kawajiri and was prepared by a conventional process was packed into each reactor tube in the same manner as the characterizing manner of Kawajiri such "that the volume of catalyst particle becomes smaller as the position of catalyst layer changes from the raw material gas inlet side of the tube to the raw material gas outlet side" (e.g. claim 1) and evaluated. In other words, it would be possible to say that a difference in performance between Example 6 and Comparative Example 4 in the present application corresponds to a difference in performance between the present invention and the art of Kawajiri. When a comparison is made between Example 6 and Comparative Example 4 in the present application, it is quite apparent to a skilled artisan that the catalyst of Example 6 according to the present invention is more excellent than the catalyst of Comparative Example 4 according to the art of Kawajiri in respect to both the acrylic acid yield and the catalyst life time.

Importantly, an economical effect of the difference in yield of acrylic acid between Example 6 and Comparative

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Example 4 in the present invention will be apparent from the following.

B.2. Economical effect of difference in yield of acrylic acid:

The Examiner appears to allege that there is seen no substantial difference in yield of acrylic acid between Example 6 (of the present application) and Comparative Example 4 (of the present application). Specifically, the Advisory Action of September 24, 2007 provides as follows: "The Examiner does not find the acrylic acid yield to be substantially different than the comparative examples."

However, the Examiner is greatly mistaken for the following reasons based on the economical effect of the difference in yield of acrylic acid between Example 6 (of the present application) and Comparative Example 4 (of the present application).

Hereinafter, the economical effect is explained. For the explanation, the following documents (Exhibit A and Exhibit B) are referred to. A copy and partial English translation of each of them (Exhibit A' and Exhibit B') is enclosed herewith as follows.

- Exhibit A: "Chemical Economy", extra issue of March 2007, front page, pages 87 to 90, and imprint page (six pages total);
- Exhibit A': Partial translation of Exhibit A (two pages);
- Exhibit B: "Chemical Economy", extra issue of July 2007, front page, pages 16 to 19, and imprint page (six pages total); and

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- Exhibit B': Partial translation of Exhibit B (one page).

For example, the yield of acrylic acid in each of Example 6 (of the present application) and Comparative Example 4 (of the present application) is as follows.

- 88 mol % in Example 6
- 85.8 mol % in Comparative Example 4

Therefore, about 1.136 mol ( $= 1/0.88$ ) of propylene is needed for obtaining 1 mol of acrylic acid in Example 6, and 1.166 mol ( $= 1/0.858$ ) of propylene is needed for obtaining 1 mol of acrylic acid in Comparative Example 4.

The molecular weights of propylene and acrylic acid are 42 g/mol and 72 g/mol respectively. Hereupon, if the price of propylene is set at \$947/ton (value in the 1Q of 2005 according to Table 5 on page 18 of Exhibit B), then the price of propylene for obtaining 1 mol of acrylic acid in Example 6 is lower than in Comparative Example 4 by about \$0.0012 ( $= \$947/1,000,000 \times (1.166 - 1.136) \times 42$ ). The total demand for acrylic acid in the world is about 3,000,000 tons/year (value in 2005 according to Fig. 1 and item "Acrylic Acid" in Exhibit A), so that the above price difference corresponds to an economical effect of about \$50,000,000 ( $= \$0.0012 \times 3,000,000 \times 1,000,000/72$ ) per year. Furthermore, at present, the demand for acrylic acid is increasing ever more due to increase of production of acrylic acid in China and due to establishment of more facilities by acrylic acid makers, and also a rise in the price of propylene accompanying a rise in the price of crude oil is continuing. Therefore, as discussed above, it is a

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matter of course that the present invention as claimed can have a substantial economical effect.

As can be understood from the above-mentioned, the economical effect of the difference in yield of acrylic acid between Example 6 (of the present application) and Comparative Example 4 (of the present application) is great, and such is an understatement. Therefore, the Examiner's allegation that "the acrylic acid yield [is] substantially different than the comparative examples" appears to only be based on a judgment from an apparent difference in numerical value without considering the above economical effect and to be a wrong recognition.

#### C. Housekeeping matters

##### C.1. Period For Reply

A shortened statutory period for reply was set to expire three months from the mailing date of the Office Action of August 1, 2007. August 1, 2007 plus three months is November 1, 2007. This paper is being filed on or before Thursday, November 1, 2007.

##### C.2. Status

The Office Action of August 1, 2007 was made final.

##### C.3. Disposition Of Claims

Claims 2-4 are pending.

##### C.4. Application Papers

This case includes no drawings.

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C.5. Priority under 35 U.S.C. §§ 119 and 120

Acknowledgement of the claim for foreign priority was made in the Office Action dated March 28, 2007. This is appreciated.

Receipt of the certified copy of the priority document was acknowledged in the Office Action dated March 28, 2007. This is appreciated.

C.6. Attachments

Applicant has filed five PTO-1449 forms in this case, a first and second with the filing of this case on January 26, 2004, a third on August 4, 2004 (stamped as received on August 9, 2004), a fourth on April 11, 2006, and a fifth on October 15, 2006. All of the references on the PTO-1449 forms have been initialed, and all of the PTO-1449 forms have been signed and returned. Such is very much appreciated.


D. Summary

Applicant respectfully submits that the present application is now in condition for allowance. The Examiner is respectfully invited to make contact with the undersigned by telephone if such would advance prosecution of this case.

Respectfully submitted,

Date: 10-27-07

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